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(54) Title: ADAPTION OF SERVICES IN A TELEPHONE NETWORK

(57) Abstract

The present invention relates to an arrangement for improving the service architecture for a compound network, comprising several types of access, as well as comprising parallel service nodes/networks for respective access technologies, and for the purpose of making customer specific adaptations to the service layer more flexible and allowing for a more cost–effective support of access specific protocols and service, it is according to the present invention suggested that said arrangement comprises an open service control protocol allowing support of access specific protocols and services while also allowing the respective access networks to share the same access nodes and service architectures.

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ADAPTION OF SERVICES IN A TELEPHONE NETWORK

FIELD OF THE INVENTION

The present invention relates to an arrangement for improving the service architecture for a compound telephone network, comprising several types of access/protocols as well as comprising parallel service nodes.

In other words, the present invention finds its application in the field of H.323 and service control.

BACKGROUND OF THE INVENTION

The present invention has been developed in connection with problems encountered when making service specific adaptations to the requirements of the individual customer in a network.

The problem is that the respective service logic is highly integrated into the switching logic of the core network. This means that new service logic and service adaptations may require changes in the core switching functions. This again makes it very hard to make customer specific adaptations to the service layer.

For example, big changes in the IN services can not be made without updating the switches in the network, i.e. even if the control in reality is between the handset and node 1 in the network, there is "transport equipment" that also has to be updated as service control uses the same control data/mechanisms/paths as these transport nodes.

KNOWN SOLUTIONS AND PROBLEMS WITH THESE

As explained above the main problem with traditional networks is that the service control protocols are integrated with lower layer functions such as call and media control.

This binds the service control plane to lower layer functions such as basic switching functions and introduce system couplings that make customisation of service control expensive.

The service control and services are thus often tied to given access protocols. This often leads to building of parallel service networks with minor differences in protocols and services. Each service network then solves the service issues for one specific type of net. This typically results in costly and ineffective service development frameworks that are inflexible, costly and hard to maintain.

For the IP telephone networks as defined by the H.323 standard, the service control protocol is defined by the H.450 standards-suite. This defines an in-band service control protocol that is carried within the H.225.0 call control plane (a defined subset of Q.931). This protocol defines a set of ASN.1 service control messages that are used for invoking and controlling services. The problems with this approach is summarized as:

Introduction of new services requires updates of H.450 messages and decoding logic in the gatekeeper. This slows down introduction of service logic as it requires both a standardisation process and updates to the switch control plane.

Adaptation of service control to vendor specific control messages/logic becomes impossible (or costly) as it relates to the switching core.

Integration and interworking with messaging protocols becomes heavier as it requires more transcoding of messages. The user-user messages and user-service messages are carried within the same messages and framing. In order to

identify user-service messages, all messages need to be analysed - not only those addressed for services. The protocol is ASN.1 encoded and does not easily integrate with MIME encoded messaging services.

OBJECTS OF THE INVENTION

An object of the present invention is to provide an arrangement, by which a cost effective and adaptive service architecture for a compound network comprising several types of access, can be implemented in a far more expedient and versatile manner.

Another object of the present invention is to provide an arrangement, by which the service networks can more easily be integrated and developed.

Still another object of the present invention is to provide an arrangement whereby the service architecture and access technologies are made more flexible and more easy to maintain.

BRIEF SUMMARY OF THE INVENTION

The above objects are achieved in an arrangement as stated in the preamble, which according to the present invention is characterized in that said comprises an open service control protocol allowing support of access specific protocols and services while also allowing the respective access networks to share the same access nodes and service architectures, said open service control protocol is adapted for removing the coupling between the access/service technology and the switching logic in the core network.

In other words, the invention aims at customization of service control protocols by allowing the service control to be specialised independently from the other control functions such as call control and media control.

The invention proposes to use an open service control protocol that allows for a more cost-effective support of access specific protocols and services while also allowing the respective access networks to share the same service nodes and service architectures. The solution also aims at removing the coupling between the access/service technology and the switching logic in the core network. The proposed solution is based on H.323 being extended with HTTP for the service control.

Further features and advantages will appear from the following description taken in conjunction with the enclosed drawings, as well as from the enclosed patent claims.

BRIEF DISCLOSURES OF THE DRAWINGS

Figure 1 is a schematical layout illustrating multiple access type and service node architecture.

Figure 2 is a schematical layout illustrating the general principle of the present invention, comprising composed single service node with plugin architecture, giving homogeneous architecture with access adapters.

Figure 3 is a simplified block diagram illustrating a reference model according to the present invention.

Figure 4 is a schematical layout illustrating a service node structure according to an embodiment of the present invention.

Figure 5 is a schematical layout illustrating an example of usage according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

In Figure 1 there is in a schematical layout illustrated a prior art multiple access type and service node architecture.

In order to elevate the problems related to the service architecture for such a compound network comprising several types of access, as well as comprising parallel service nodes/networks for respective access technologies, it is according to the present invention suggested to use an open service control protocol, as this will be discussed in further detail with reference to Figure 2.

Figure 2 illustrates a homogeneous service architecture with access adapters, according to the present invention, by which the open service control protocol can be implemented, so as to allow for a more cost effective support of access specific protocols and services while also allowing active access networks to share the same service nodes and service architectures.

With the suggested solution which can be embedded in the general layout according to Figure 2, it is also possible to remove the coupling between the access/service technology and the switching logic in the core network.

The proposed solution is based on H.323 being extended with HTTP for service control.

More specifically, the proposed solution replaces the H.450 standards suites with the more open and extendable HTTP protocol. The solution also makes use of the feature set of HTTP to add the required flexibility. Among these features are found:

HTTP Tunnelling

The tunnelling feature refers to the use of the HTTP transport layer protocol for carrying other data protocols (in which case the HTTP headers carry information about what kind of payload type/protocol that is being carried).

Server Side Plugin

The plugin approach represents the server side equivalent of browser plugins where 3rd party plugins (objects/functions) can be added dynamically. The invocation of a plugin is controlled through the content-type field or through selections/filters on the given path. The binding between the plugin and the invocation criteria is set through configuration.

Servlet Functions

The servlet approach relates to servlet objects that implements CGI like functions, but may add persistency over sessions and is being object oriented.

DESCRIPTION OF SOLUTION

The invention disclosure relates to an H.323 based telephone network where clients makes phone calls through a central call-/control processing switch called a gatekeeper. The gatekeeper performs call-/control processing functions such as charging, routing and resource control and may also activate call related services on a service node according to the call states and the user profiles. When the client and the gatekeeper talks different languages/dialects, an access node is added in between to perform the required gateway functions.

In Figure 3 there is illustrated a simplified network reference model.

This invention disclosure proposes to replace the H.450 based service control protocol between the access nodes and the gatekeeper/service node with an HTTP based protocol. This means that service configuration- and control messages are being HTTP encoded by the access nodes and decoded, analysed and executed by the service node. This again means that there is no normalisation of the service protocols in the access nodes and that the mapping from the access specific service data to the service node languages are being performed by service node plugins/servlets.

The service node represents a set of software processes being capable of executing phone services and interacting with the gatekeeper. The service node thus provides a set of service functions and offers a programming API for service execution and control. The service node does also provide an HTTP server that supports HTTP tunnelling, servlets and server side plugins. Through the use of this HTTP server it is possible to write a plugin or servlet that interacts with the programming API in order to control the service execution. An example of this could be a plugin that translates DTMF codes to API method calls, e.g. DTMF '*23*1*1530#' may translate to API method 'userIsBusyTo(15.30)'.

In Figure 4 there is given an illustration of the service node architecture.

In order to provide acceptable service availability the service node and the HTTP server will need to support installations of new plugins/servlets in runtime. Further, the architecture needs to be such that faulty plugins, servlets or sessions does not impair the operation of the service node.

The described architecture and feature set supports access specific service control messages as well as customer spe-

cific adaptation of the service network and the service control protocols, though within the limits of the feature set of the service API. This is illustrated through the following two examples.

In order to add an access specific service control protocol such as QSIG, the vendor would need to write an access node and a service plugin/servlet.

The QSIG access-node would translate the call- and connection control messages into the H.323 format, but would tunnel the QSIG messages inside HTTP messages and address these to the service node.

A QSIG plugin/servlet would be written and installed on the HTTP server of the service node. The logic of this plugin/servlet would translate the QSIG messages into method calls (and capability sets) in the service API. When a QSIG service control message is sent from a PBX, the access node will wrap the QSIG message into an HTTP frame and send it to the service node. The HTTP server on the service node will receive the package, detect that the format is something called QSIG, look up in its configuration data and activate the correct plugin/servlet for QSIG. This plugin/servlet will analyse the QSIG message, make method calls in the API and return the appropriate QSIG encoded response.

When new features are added to the service node and the service API, the updates can be provided to the access specific parts through updates of the plugins/servlets, i.e. there are no updates required in the access nodes.

In order to add a provider specific service control protocol e.g. based on GSM-SMS, the provider would need to write a plugin/servlet that translates the GSM-SMS messages into method calls over the service API. The procedures are as defined above, but in this case an external 3rd part can do

provider specific customisation to the service network without being tied up to new deliveries of the core system. In Figure 5 it is illustrated the GSM-SMS example alongside a default option.

ADVANTAGES

Added Flexibility

The service control protocol is more flexible in terms of supporting different service control data formats/encoding standards. For each new encoding standard, a new plugin needs to be encoded.

Simplicity

The service control protocol becomes more flexible in that it is simpler to add new service control messages and supporting these. It becomes simpler to debug the system, to secure the message transport (cf. SSL) and to get the data through firewalls and proxies.

Customisation

The solution allows the service provider to add provider specific service control messages independent from the system solution provider. This means that a provider can add new control messages for decoding these independent from the system provider (e.g. add a new SMS message and update the plugin for decoding this).

Performance

The messages are being addressed towards the correct recipient, meaning that the gatekeeper does not need to analyse all messages (incl. user-user msg.) in order to pick up the user-service data.

BROADENING

1) Integration with Messaging Applications

The HTTP service control format follows the MIME encoding standard that is used by SMTP, NTTP and S/MIME messaging applications. It is expected that it should be possible to integrate this service control with these messaging applications.

2) Support for Notification Services

The principle can be extended to allow the application server to issue HTTP messages/notifications to the clients (e.g. when the client registers). This can for example be used for notifying the user about new e-mail messages in the in-box.

3) Extensions for Supporting the SIP Protocol

The SIP protocol builds on using the HTTP protocol and can probably be integrated into the system solution relatively simple if the application server supports call-from-the-blue services.

4) Terminal (gateway) to Terminal (gateway) Service Control

If two terminals (or their gateways) want to exchange service control/data they could exchange this service control/data on a language that they have agreed on. The respective entities (terminals or gateways) can also dynamically download transcoder servlets/plugins from a central depository upon need.

This could for example be used when user A on his PC is sending user B on a GSM terminal an email message. The GSM gateway decides that email is not understood and retrieves some transcoder for handling this email. The choice of

transcoder can be selected according to user preferences, previous user behaviour, network or operator criteria. Examples of transcoders here could be:

- Transcoder from email to GSM-SMS message
- Transcoder from email to voice rendering
- Transcoder from email to WAP

5) Access Control based on Service Control Plugin

The access to transcoder functions (servlets/plugins) can be controlled according to subscription profiles, user locations and other metrics of the system. Further more can the invoked transcoder function apply access control on the specific information elements of the service control/data protocols. This could e.g. be used to control when and from where a given service is used and what kind of service data that is legal in the given context. An example could be to filter on the contents of a GSM-SMS message to ensure that no pornographic data is being transmitted. (The transcoder would in this case act as an application layer firewall.)

APPENDIX

Terminology

ITU-H.323	A family of ASN.1 encoded protocols defining message formats, encoding standards and call state sequences of multimedia conferences on an Internet protocol infrastructure.
ITU-H.225.0	A subset of the H.323 standards suite being based on Q.931 and defining call control messages, encoding standards and call-state sequences.
ITU-H.450	A suite of ASN.1 standards defining service control protocols to be used for service control in an H.323 network. The H.450 messages are being carried within H.225.0 messages.
ITU-Q.931	Telephony standard for call control that defines call control messages, encoding standards and call-state sequences.
ASN.1	Abstract Syntax Notation Number 1 A formal data structure definition language
HTTP	A MIME (ascii) encoded protocol for transport of world-wide-web data. The protocol is open for tunnelling of other protocols.
CGI	Common Gateway Interface A script language used for customisation of web page contents
API	Application Programming Interface
DTMF	Dual Tone Multiple Frequency
QSIG	A service control protocol used by PBX
PBX	Private Branch Exchange
GSM	Global System for Mobile Communication A widely employed standard for mobile communication
SMS	Short Message Service Messaging service protocol employed within GSM
SSL	Secure Socket Layer Security protocol employed for Transport Layer

	Security
MIME	Multipart Information Message Entity Protocol encoding format based on ascii characters
SIP	Session Initiation Protocol IP Telephony protocol based on HTTP
SMTP	Simple Mail Transfer Protocol Protocol for transport/exchange of email messages
NTTP	Network News Transfer Protocol Protocol for transport/exchange of news messages
S/MIME	Secure MIME
WAP	Wireless Access Protocol A web protocol for mobile devices (i.e. 'a-kind-of' HTTP for mobile handsets)

Patent claims

1. Arrangement for providing an improved service architecture for a compound telephone network,
c h a r c t e r i z e d i n that said arrangement comprises an open service control protocol allowing support of access specific protocols and services while also allowing the respective access networks to share the same access nodes and service architectures,
said open service control protocol is adapted for removing the coupling between the access/service technology and the switching logic in the core network.

2. Arrangement as claimed in claim 1,
c h a r c t e r i z e d i n that said open service control protocol is based on H.323 standard for communication across Internet Protocol (IP) based networks, said H.323 standard being extended with HTTP (Hyper Text Transport Protocol) for the service control.

3. Arrangement as claimed in claim 1 or 2,
c h a r c t e r i z e d i n that said H.323 standard with extended HTTP protocol is adapted to enhance or replace the H.450 suite of protocols, the adaptation also making use of the feature set of HTTP to add the required flexibility.

4. Arrangement as claimed in claim 3,
c h a r c t e r i z e d i n that said features of the HTTP may include:

- HTTP tunnelling
- Service Side Plugin
- Servlet Functions

5. Arrangement as claimed in claim 3 or 4,
c h a r c t e r i z e d i n that between the access nodes and the gatekeeper/service node there is introduced

an HTTP based protocol, which entails that the service configuration and control messages are being HTTP encoded by the access nodes and decoded, analysed and executed by the service node.

6. Arrangement as claimed in claim 5, c h a r c t e r i z e d i n that no normalisation of the service protocols in the access node has to be performed, and that the mapping from the access specific service data to the service node languages are being performed by service node plugins/servlets.

7. Arrangement as claimed in claim 6, c h a r c t e r i z e d i n that the service node represents a set of software processes being capable of executing phone services and interacting with the gatekeeper, the service node thus providing a set of service functions and offering a programming API for service execution and control.

8. Arrangement as claimed in claim 1, c h a r c t e r i z e d i n that said network includes a service node which also provides an HTTP server that supports HTTP tunnelling, servlets and server side plugins, the use of this HTTP server making it possible to write a plugin or servlet that interacts with the programming API in order to control the service execution.

9. Arrangement as claimed in claim 8, c h a r c t e r i z e d i n that the arrangement comprises a plugin/servlet that translates from access specific service control to generic service API method calls.

10. Arrangement as claimed in claim 9, c h a r c t e r i z e d i n that the access node is adapted to tunnel the access specific service control data to the plugin/servlet by use of HTTP, which plugin/servlet

then transcodes this access specific service control to said generic service API method calls.

11. Arrangement as claimed in claim 9 or 10, c h a r c t e r i z e d i n that a server side plugin/servlet can be installed and updated in run-time.

12. Arrangement as claimed in claim 11, c h a r c t e r i z e d i n that said server side plugin/servlet can be provided by 3rd parties.

13. Arrangement as claimed in any of the claims 9-12, c h a r c t e r i z e d i n that said server automatically selects correct plugin/servlet according to configured rules in the server and the type of service control data being signalled, the type of data being signalled is indicated by the HTTP protocol.

14. Arrangement as claimed in any of the claims 9-13, c h a r c t e r i z e d i n that the plugin/servlet will format the return codes/states from the generic API calls to access specific return codes/states and return these using the HTTP protocol.

15. Arrangement as claimed in claim 14, c h a r a c t e r i z e d i n that the respective entities involved (terminal or gateway) can dynamically download transcoder servlets/plugins from a central repository upon need.

16. Arrangement as claimed in claims 15, c h a r a c t e r i z e d i n that access to transcoder functions (servlets/plugins) can be controlled according to subscriber profiles, user locations and other metrics of the system.

17. Arrangement as claimed in claims 15-16, c h a r a c t e r i z e d i n that the invoked

transcoder function can be arranged to apply access control to the specific information elements of the service control/data protocols.

Fig-1: Access Specific Service Architecture / mulitple Service Nodes

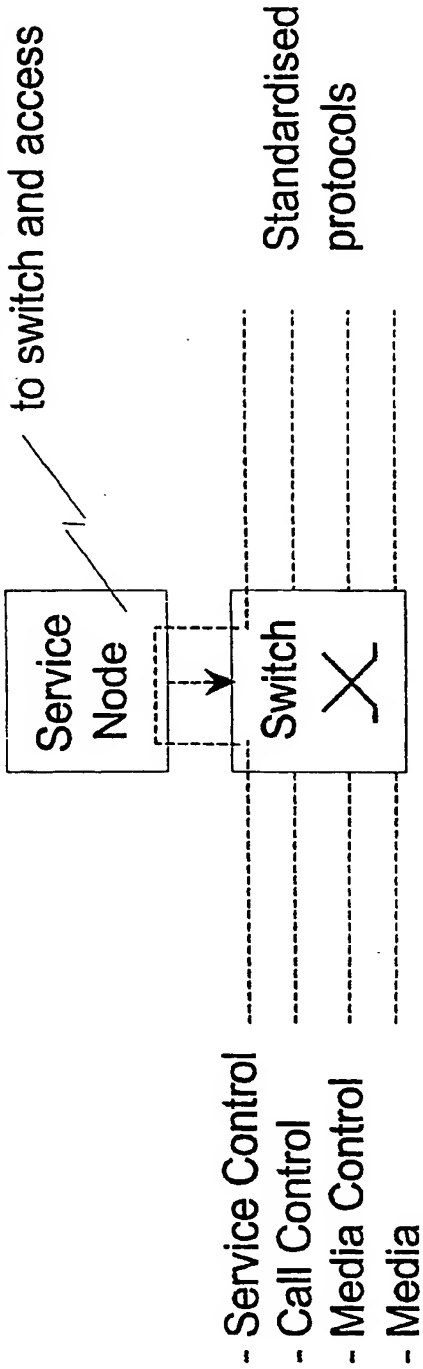
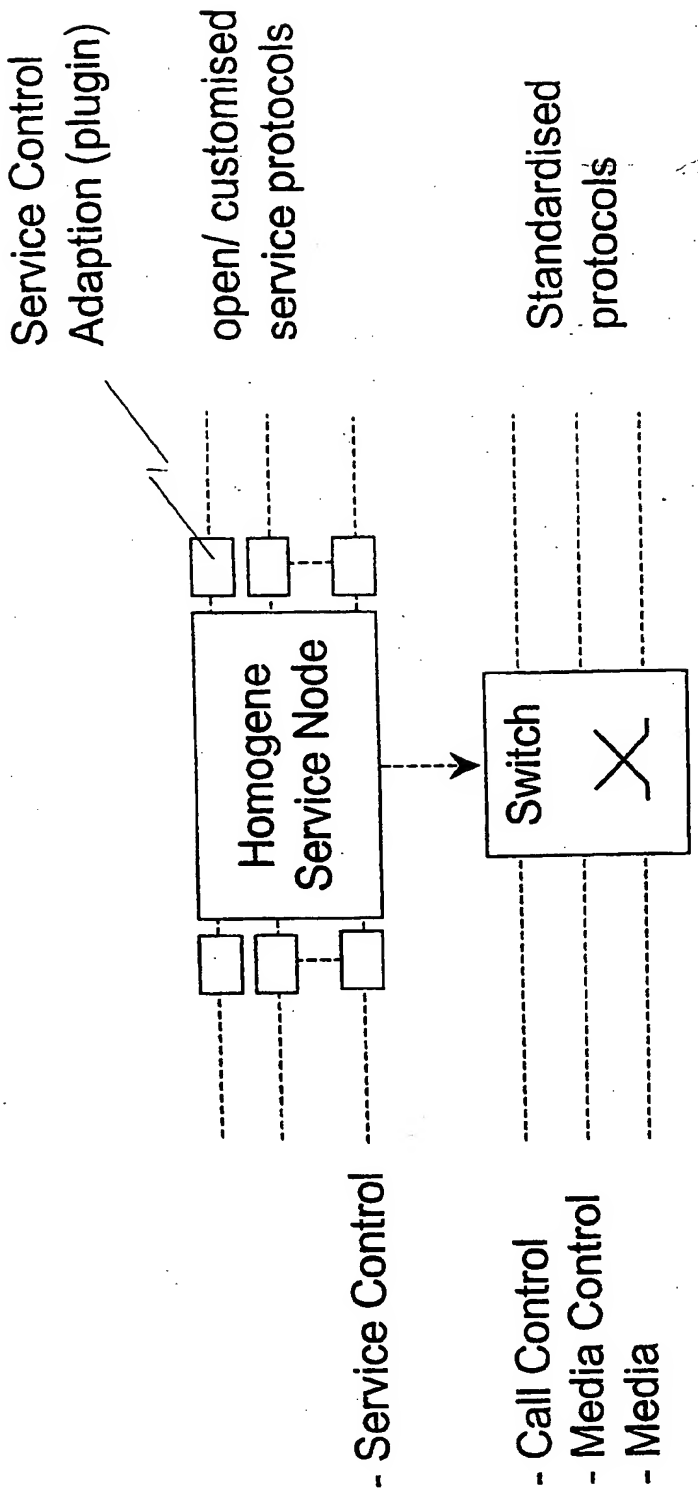


Fig-2: Homogenous Service Architecture with Access Adaptors



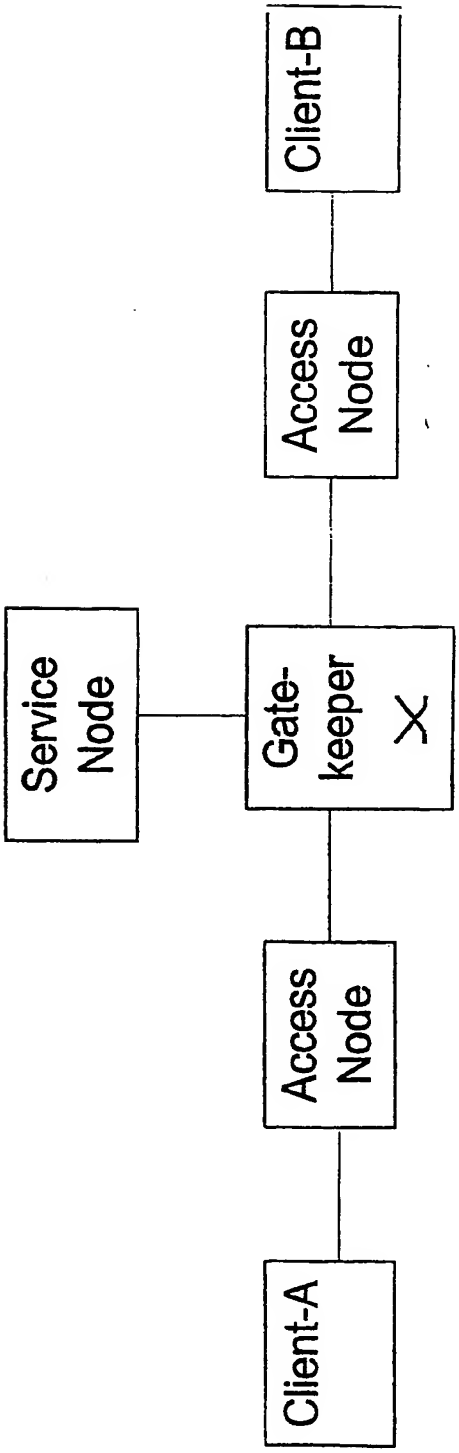


Fig-3: Simplified Reference Model

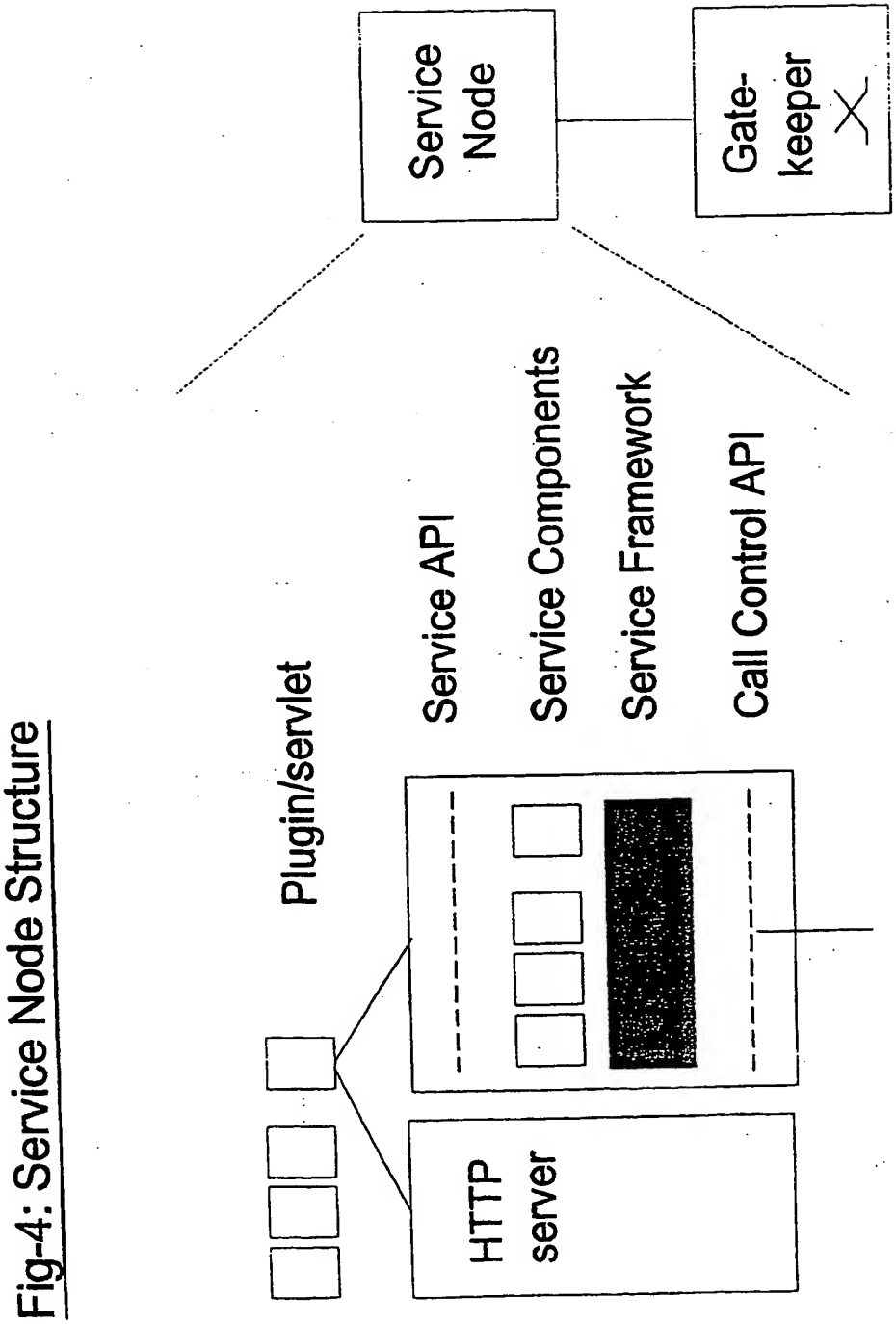
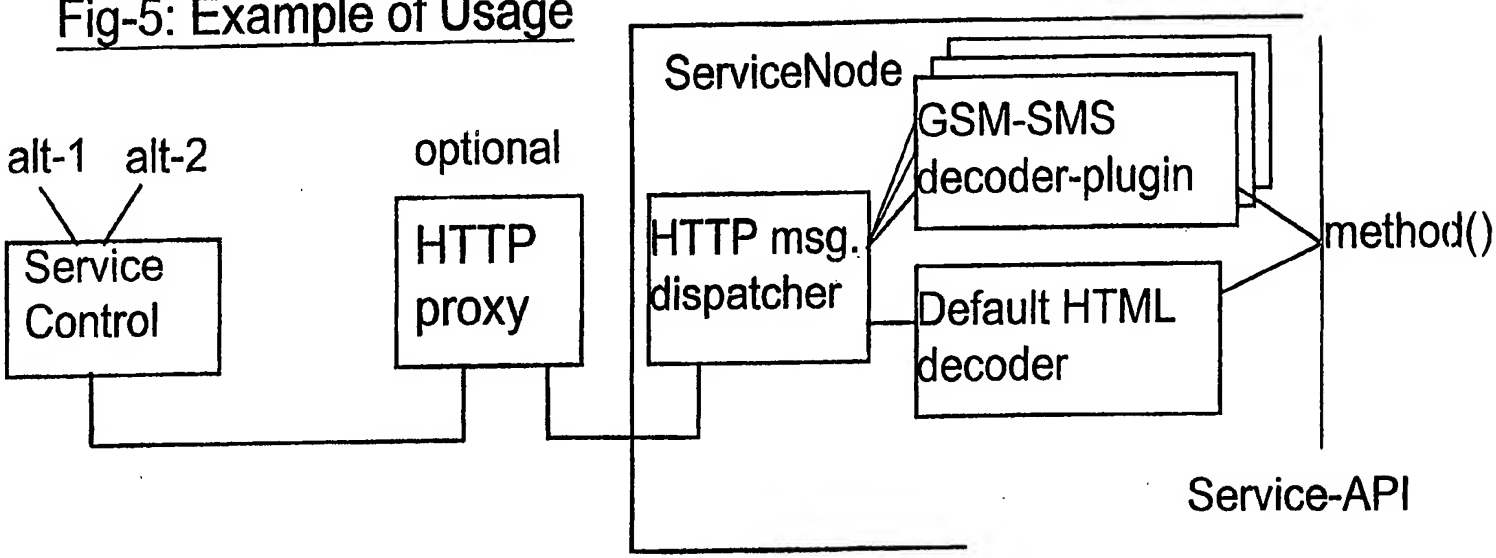


Fig-4: Service Node Structure

Fig-5: Example of Usage



alt-1 (std. example):
HTTP POST http: //ApN.domain/cmd
Content-type: text/html
Content-length: 378
...
<html><body>
cmd=callback
destination=etobn@eto.ericsson.se
userId=etoarni@eto.ericsson.se
</body></html>

alt-2 (gsm example):
HTTP POST http: //ApN.domain/cmd
Content-type: application/gsm-sms
Content-length: 562
...
<GSM-SMS message>